

AMENDMENTS TO THE SPECIFICATION:

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 03/02174
filed on June 30, 2003.

[0000.6] BACKGROUND OF THE INVENTION

Page 2, please replace paragraph [0005] with the following amended paragraph:

[0005] Summary of the Invention

SUMMARY OF THE INVENTION

Page 5, please replace paragraph [0013] with the following amended paragraph:

[0013] Drawing

BRIEF DESCRIPTION OF THE DRAWINGS

Please replace paragraph [0014] with the following amended paragraph:

[0014] The invention will be described in further detail below in conjunction with the
~~drawing:~~ **drawings, in which:**

Please delete paragraph [0015].

Please replace paragraph [0016] with the following amended paragraph:

[0016] Fig. 1[[,]] **is** a hydraulic circuit diagram of a fuel injection system of the invention in
the state of repose and upon restoration;

Please replace paragraph [0017] with the following amended paragraph:

[0017] Fig. 2[[,]] **is** a hydraulic circuit diagram of a fuel injection system of the invention
upon injection;

Page 6, please replace paragraph [0018] with the following amended paragraph:

[0018] Fig. 3[[,]] **is** a fuel injection system of the invention in a coaxial construction; and

Please replace paragraph [0019] with the following amended paragraph:

[0019] Fig. 4[[,]] **is a diagram of** a further embodiment of a fuel injection system of the invention in the state of repose and upon filling.

Please replace paragraph [0020] with the following amended paragraph:

[0020] Variant Embodiments

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please delete paragraph [0021].

Please replace paragraph [0022] with the following amended paragraph:

[0022] **Fig. 1 shows a hydraulic circuit diagram of a fuel injection system of the invention in the state of repose and upon restoration.** The system includes a high-pressure fuel source 1, for instance a pressure reservoir (common rail), which stores fuel compressed by a high-pressure pump to up to 1600 bar. From the high-pressure fuel source 1, the fuel is carried via a high-pressure line 27 to the injectors, which each include one control valve 14, one pressure boosting device 7, and one fuel injection nozzle 2.

Page 11, please replace paragraph [0027] with the following amended paragraph:

[0027] Thus in the state of repose, all the pressure chambers (11, 12, 9) of the pressure boosting device 7 are acted upon by high pressure, and the pressure booster piston 8 is pressure-balanced. The pressure boosting device 7 is deactivated, and no pressure boosting occurs. Via the restoring spring 13, the pressure booster piston 8 is kept in its outset position. The high pressure in the injection nozzle control chamber 20 exerts a hydraulic closing force on the nozzle piston 3, which keeps the fuel injection nozzle 2 closed, together with the

closing force of the closing spring 24. These two forces together are greater than the hydraulic force acting in the opening direction on the nozzle piston 3 in the injection nozzle high-pressure chamber 21, and so despite the high pressure that constantly prevails in the injection nozzle high-pressure chamber ~~[[1]]~~ **21**, the injection openings remain closed by the nozzle needle ~~[[50]]~~ **5**. Consequently, no injection takes place.

Page 12, please replace paragraph [0030] with the following amended paragraph:

[0030] In the preferred embodiment of the present invention shown in Fig. 2, the high-pressure fuel source 1 communicates (including during the injection) via a high-pressure line 27 with the pressure booster work chamber that is included in the pressure boosting device 7. ~~[[The]]~~ **In the** pressure booster work chamber 11, the high pressure from the high-pressure fuel source 1 acts in the compression direction 36 on the large piston face 35 of the first pressure booster piston region 18. Only the low pressure in the pressure booster control chamber 12, the force of the restoring spring 13, and the high pressure in the pressure booster high-pressure chamber 9 act counter to the compression direction 36, ~~but only on the small piston face 37~~. The force in the compression direction 36 predominates. The pressure booster piston 8 therefore moves in the compression direction 36 in the housing 28 of the pressure boosting device 7 and compresses the fuel in the pressure booster high-pressure chamber 9 and thus also increases the pressure in the injection nozzle high-pressure chamber 21. As a result of the pressure difference between the injection nozzle high-pressure chamber 21 and the injection nozzle control chamber 20, the nozzle piston 3 moves in the opening direction counter to the closing force of the closing spring 24 and uncovers the injection openings 6. Fuel 34 is now injected into the combustion chamber 25 at an increased pressure, compared to the pressure in the high- pressure fuel source 1, by means of the pressure boosting device 7.

Page 14, please replace paragraph [0033] with the following amended paragraph:

[0033] For terminating the injection, the control valve is switched back into the first switching position 15 (Fig. 1), so that the pressure booster control chamber [[9]] **12** and the injection nozzle chamber 20 can be disconnected from the low-pressure line 17 and made to communicate with the high-pressure fuel source 1. In the pressure booster control chamber [[9]] **12**, the high pressure builds up again as a result. In the pressure booster high-pressure chamber 9, the pressure drops to the high pressure generated by the high-pressure fuel source 1. The pressure booster piston 8 is now hydraulically balanced.

Page 15, please replace paragraph [0036] with the following amended paragraph:

[0036] For stabilizing the switching sequences, still further provisions may be made for damping ~~vibration~~ **fluctuations** between the high-pressure fuel source 1 and the injector. This can be done for instance by means of an optimized design of a throttle 22 in the high-pressure line 27. Alternatively, a throttle check valve (not shown) may be inserted at an arbitrary point in the supply line (27, 31, 32).

Please delete paragraph [0037].

Please replace paragraph [0038] with the following amended paragraph:

[0038] **Fig. 3 shows a fuel injection system of the invention of coaxial construction.**

Here, the pressure boosting device and the fuel injection nozzle are located coaxially to one another in a common injector housing 39. In the injector housing 39, two parts movable relative to one another are resiliently supported: a pressure booster piston 8 and a nozzle piston 3. The pressure booster piston 8 has a first (larger-diameter) pressure booster piston region 18 and a second (smaller-diameter) pressure booster piston region 19. The injector housing 39 likewise has a steplike tapering 41. The (larger-diameter) first pressure booster

piston region [[19]] **18** is guided axially and largely in fluid-tight fashion by the larger-diameter part of the injector housing 39. The (smaller-diameter) second pressure booster piston region 19 is located partly in the larger-diameter part of the injector housing 39 and plunges partway into the smaller-diameter part of the injector, where it is guided axially displaceably and in largely fluid-tight fashion. The larger-diameter first pressure booster piston region 18 ~~divides~~ separates the pressure booster work chamber 11 and the pressure booster control chamber 12 from one another in the interior of the injector housing 39. The restoring spring 13 surrounding the smaller-diameter second pressure booster piston region 19 is located in the pressure booster control chamber 12. The restoring spring 13 is braced by one end in the region of the steplike tapering 41 of the injector housing 39 and on the other on the larger-diameter first pressure booster piston region 18. In the state of repose, it presses the pressure booster piston 8 into its position of repose against a limiting element 42 located in the injector housing 39. The pressure booster piston 8 is embodied as a hollow piston: It includes a central through bore 43. The nozzle piston 3 is guided in largely fluid-tight fashion in a guidance region 44 in this bore 43.

Page 17, please replace paragraph [0040] with the following amended paragraph:

[0040] The closing spring 24 is surrounded in the bore 43 by the injection nozzle control chamber 20. In the preferred embodiment of the present invention shown in Fig. 3, the injection nozzle control chamber 20 is thus located in the pressure booster piston 8, which is embodied as a hollow piston. The pressure booster piston [[3]] **8** includes at least one opening 46, by way of which the injection nozzle control chamber 20 communicates continuously with the pressure booster control chamber 12, so that the pressure in the two chambers 12, 20 is always balanced.

Page 18, please replace paragraph [0043] with the following amended paragraph:

[0043] The metering of the fuel into the combustion chamber 25 is again done by activation of the 3/2-way control valve 14. As a result, the pressure booster control chamber 12 is made to communicate with the low-pressure line 17 via the connecting line 32 and is thus pressure-relieved. This activates the pressure boosting device, and the fuel is compressed in the high-pressure chamber 47 by the pressure booster piston [[3]] **8**. The compressed fuel is carried onward along the nozzle needle 5. Finally, as a consequence of the increasing opening pressure force in the high-pressure chamber 47, the nozzle piston 3 uncovers the injection openings 6, and the fuel is injected into the combustion chamber 25. With the fuel injection nozzle open, the nozzle piston 3 rests with the sealing seat 26 on the pressure piece 45 and thus closes the filling connection 10 in a fluid-proof fashion. Hence no compressed fuel can flow back into the injection nozzle control chamber 20 from the high-pressure chamber 47.

Page 21, please replace paragraph [0048] with the following amended paragraph:

[0048] For injection, the control valve 14 is switched from the first switching position 15 to the second switching position 16. In the second switching position 16, the pressure booster work chamber 11 communicates with the high-pressure fuel source 1. [[The]] **In the** pressure booster work chamber 11, the pressure generated by the high-pressure fuel source 1 builds up. As a result, the pressure booster piston 8 moves in the compression direction and compresses the fuel in the pressure booster high-pressure chamber 9 to boosted pressure. This **boosted pressure** is carried onward into the injection nozzle high-pressure chamber 21. The nozzle piston 3 moves in the opening direction as a result of the pressure force thus generated and uncovers the injection openings 6. Simultaneously, the filling connection 10 from the

pressure booster high-pressure chamber 9 to the injection nozzle control chamber 20 is closed by the nozzle piston 3. Thus no lost quantity occurs during the injection.

Page 22, please add the following new paragraph after paragraph [0049]:

[0050] The foregoing relates to a preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.

Please delete pages 23, 24, and 25.